THE POWER OF HEAT IN PROPELLING SHIPS.

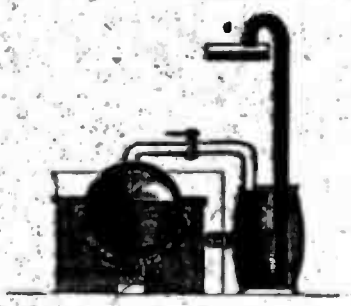

Fig. 1.

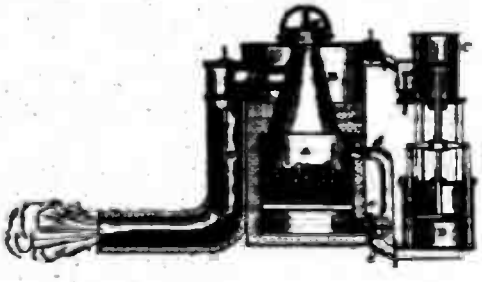

Fig. 3.

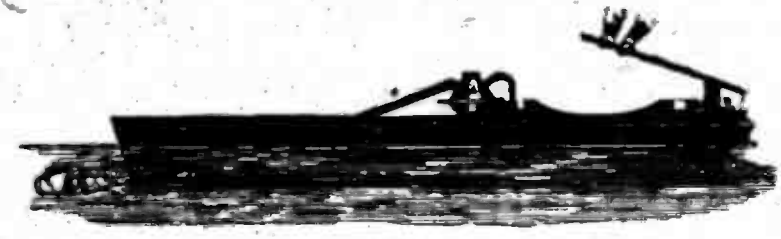

Fig. 2.

tained by filling in the compartment of the wall which faces the lower flight of the stairs with looking-glass—in such manner, perhaps, as to produce the appearance of an openwork carved screen.

Having now gone over that part of the plan which the annexed cut shows remodelled, I will bring these remarks to a close by merely observing in addition, that what is called the "picture gallery" seems to be very little suited to such purpose, there being so many windows and large folding-doors as to leave but small space on the walls for pictures. A capital room for a gallery of the kind might be easily formed by erecting another wing, corresponding with the conservatory,—that is, in plan and size, but lighted from its ceiling. Even were its exterior quite bare, that would not matter where there is no beauty to mar; besides, screening by planting out would sufficiently cut it from the rest of that garden front. Such addition to the plan would be attended with material improvement internally, as there would then be a superior suite of reception rooms, with a conservatory at one end, and a picture gallery (serving occasionally as a ball-room) at the other. Q. E. D.

A Carriage porch.
B Hall.
C Dining-room.
d Sideboard alcove.
E Serving-room.
f Lift.
G Corridor and waiting-room.
A A Screen filled in with looking-glass.

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Steam, as we lately reminded our readers, is but one way of using the power of heat in marine or other propulsion. Another mode we at same time noted as at present on trial at New York,* namely, by means of air as the instrument. Even air or gaseous products, however, may be used as an instrument of power in more ways than one. In the case under notice atmospheric air was used much as steam has been, along with pistons, cylinders, shafts, and other pieces of machinery. But another mode of using air and other gaseous matter in marine propulsion, almost without machinery at all, has been suggested, a mode which has been compared to the principle on which a rocket may be made to move spontaneously through water, or which we may regard, in some measure, as a sort of artificial wind, only issuing from the bowels of the ship, and rushing out immediately into and against the adjoining water, in place of issuing through the air and impinging on the sails attached to a ship.

We shall not express any very decided opinion on this proposed mode of propulsion; but the main idea is at least correct, that a rushing powerful wind, issuing like a gale or hurricane in miniature from behind a ship, and instantly striking against the water in which she floats, will have a reactive power of propulsion on the ship itself. That it *will* do so with practical efficacy or sufficient power, the projector, Mr. Alexander Gordon, is very sanguine. We will let him speak for himself, and add such illustrations as may be necessary to enable our readers fully to understand the author's project:—

The proposers of hot-air engines have taken the steam-engine, subsequent to the discoveries of Newcomen, as their model, whilst I propose to show that they should have reverted at once to the engines of Savery and of Papin; that they should be referred to the Marquis of Worcester's scantlings; and even to the smokejack of Hierooymus Cardan in 1557; and that ships may be propelled by the simple application of the *hot products of combustion rushing at high velocity from close furnaces fixed in the ship, against and below the water*, instead of employing steam-engines acting upon the water by means of paddle wheels or screws; the blow being given to the water by the hot air rushing out against the water at the rate of 1,330 feet per second, if required, instead of the blow given, as in the case of a steam engine, by wooden or iron paddles, at the rate of only 20 feet per second.

The Marquis of Worcester employed the pressure of steam in A to act at once and directly upon the water in B, which he desired to force up to C (see Fig. 1). Savery, also, used steam in direct connection with the water. Denis Papin improved on these by interposing a loose floating piston between the steam and the water to be moved.

Now, had any of these inventors used (instead of steam) the hot products of combustion from a close furnace, the steam-engine would not now be the only available, inanimate, artificial power in use for such purposes as raising water, and for locomotion and navigation.

Endeavours have been made to propel vessels by the rushing out of common air from a state of compression: these have failed because air has first to be compressed by a steam-engine, and then compressed air requires a long time *to regain its thermal equilibrium* by taking back heat from the water.

It is shown that 15 lbs. pressure on a steam-engine piston is obtained by 8 lbs. of fuel, and that 15 lbs. pressure of hot air can be had for 2·68 lbs. or only one-third of the quantity of fuel.

It appears that in a marine steam-engine one half of all the heat produced (1000°—500°) is lost by rushing off at the top of the chimney; and it has been satisfactorily shown by the Woolwich Dynamometer, that of the other half of the heat, which does not escape at the top of the chimney, nearly forty per cent. is absorbed by the air-pump, the friction, radiation, &c. &c.; so that only thirty per cent. of the heat generated in the furnaces is practically available for impelling the ship.

My invention bears resemblance to the action of a rocket in water. It is a mild rocket without the explosive mixture. It is the rushing out of air *charged with heat*, which expands on the instant of liberation.

An experiment has been made as follows:—Into a boat, 26 feet long and 4½ feet broad (see Fig. 2), I fitted a close furnace or retort, A, and a common small forge bellows, B. The close furnace being opened at top and at bottom, an intense fire was got up: the bonnets at top and at bottom were then luted and fitted tight. Each stroke of the lower portion of the bellows passed air through the close fire, and the hot products of combustion rushed out against the water by the pipe, C. [We do not think that Mr. Gordon's illustration here gives a very forcible idea of the mode in which the hot air will rush out at a high pressure or velocity against the water: Fig. 2 gives a better idea of it.] The discharge-pipe was 3 inches in diameter, and was immersed 12 inches. Each stroke of the portable forge bellows sent cold air into the close furnace. The appropriation of oxygen to support combustion was immediate; and the heating of all the aeriform body, which passed off under water, was equally so. The products of combustion, almost altogether aeriform, but also occasionally mixed with smoke, dust, and ashes, rushed out under and against the water at a very high velocity (at a temperature of 900° or 960°), and impelled the boat in her course: the fire, with one man to blow it, did the work of two men rowing.

Fig. 3 explains the principle upon which I would construct the close furnace, for sixty-horse power, as an auxiliary for a large ship, or full power for a smaller ship:—

A is a section of one or two close furnaces, the fire inside being supported by the atmospheric air, forced in at either or both of the pipes *d d*, so as to be blown either through the fire or over it, as more or less power (*i.e.* intensity of fire) is required. The furnaces to be opened once in two hours, and supplied with additional fuel by the upper close door, or bonnet, *a*: the blast of air being for the occasion turned off from the furnace which is to be opened. B B are boilers, which surround the close furnaces. The water taking up the transmitted heat affords steam to drive the simplest form of steam-engine. C. The air-pump,

* A correspondent says on this subject,—"Whatever may be the go-ahead propensities of brother Jonathan, it is a decided fact that 'caloric engines,' like the 'reaping machine,' is an invention of the Britishers. Thirty years ago the Messrs. Stirling were trying experiments upon them in the Dundee Cast Foundry, Dundee, and they superseded steam not only in their own establishment, but also in the Chapelshade Flax-spinning Mills, Dundee."

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